bring the whole profits of the trade into Russian hands, and offer greater financial facilities.

This route, although more expensive than the transport by sea through the Suez Canal, is preferred, as the quality of the tea thus transported is better.

One of the important considerations which induce the Russians to urge the building of the Pacific road is purely political. The Chinese boundary is at present almost unprotected, and it would be extremely difficult to concentrate an army of considerable strength anywhere east of Semipalatinsk. It is true that the boundary as far east as Manchuria is guarded by the best of protections, — a vast desert. Still greater weight is attributed to the connection with Vladivostok, the only harbor Russia possesses on the open ocean. Without the railroad, Vladivostok is of very little value, as the Coast Province is not able to furnish provisions for the garrison and fleet. It is hoped that its value will be greatly enhanced by the construction of the railway. A glance at the map will show that the latter follows for a long distance the boundary: therefore, in case of war with China, its safety appears very doubtful, and, indeed, it has been proposed by military authorities that it would be more advisable to build the road farther north.

From an engineering point of view, there are no serious obstacles to the building of the road, except the bridging of the large rivers of West Siberia, and the passing of the enormous swamps of that region, which would probably make the road far more costly than the Transcaspian Railway. There are no steep grades that would present serious difficulties.

The distances of the several sections of the line are given as follows: —

	Miles.
Tyumen to Tomsk	800
Tomsk to Irkutsk	1,050
Irkutsk to Stryelka	800
Stryelka to Usuri	1,000
Usuri to Vladivostok	300
Total	3,950

The cost of construction is estimated at from five to seven hundred million rubles. The whole distance from St. Petersburg to Vladivostok is estimated at six thousand miles; and the time necessary for accomplishing this distance, at from sixteen to seventeen days. To this must be added a few days for the journey from Japan and China to Vladivostok, and from St. Petersburg to western Europe. Thus the journey from eastern Asia to Europe might be made in from twenty to twenty-two days instead of from thirty to thirty-five days, which it takes steamers to run from China to England.

It seems improbable that the effect of this road upon the trade of the world will be as important as that of the American Pacific roads. The political condition of Siberia is not favorable to an energetic development of its resources and to an extensive immigration; and, the length of the road being so great, it is doubtful whether it would be able to divert the carrying-trade to any great extent from the steamers using the Suez Canal route.

SCIENTIFIC NEWS IN WASHINGTON.

Do Solids act Chemically upon Each Other? Mr. Spring's Experiments do not prove it. — The Transit of Venus and the Solar Parallax. — An Eighth Sternum Rib. — Measurements of Crania. — Adulteration of Condiments. — A New Fibre from the Stalk of the Cotton-Plant.

Chemical Action between Solids.

ONE of the most interesting papers read before the Washington Philosophical Society last spring was one by Mr. William Hallock on the formation of alloys at lower temperatures than the melting-points of either of their constituents. An abstract of the paper was published in *Science* (xi. No. 265) at the time. Mr. Spring, a distinguished chemist of Belgium, has been pursuing researches in the same field as Mr. Hallock, and has criticised some of the latter's work. At the last meeting of the Philosophical Society Mr. Hallock turned the tables on Mr. Spring by examining some experiments, a description of which had been published, to prove that chemical action takes place between solids.

Mr. Hallock began by mentioning one or two experiments illustrative of his theory of the formation of alloys, as referred to above. He placed potassium and sodium in contact, arranging a thermometer to register the temperature. As they united, the temperature fell 2°.4 C. below that of the room. A block of ice and one of rock-salt, the temperature of each being reduced 10° or 12° C. below the melting-point of the ice, when brought into contact, began immediately the formation of the solution of salt.

One of Mr. Spring's experiments to show chemical action between solids consisted of placing copper filings and sulphur in contact. The sulphur attacked the copper. Mr. Hallock doubted that this was a case of chemical action between solids, and prepared the following described experiment to satisfy himself. A piece of bright copper and a small mass of sulphur were placed near, but not in contact with each other. After a time the face of the copper was blackened by the sulphur. Thinking it barely possible that particles of copper might fly across the space between them, Mr. Hallock then varied the experiment as follows: The copper and sulphur were placed in a glass tube, with a wad of absorbent cotton an inch thick between them. The experiment was varied in several ways, in one case the tube being filled with dry air, in another the air exhausted, and in a third the tube being filled with oxygen, etc. In every case the copper was affected by the sulphur, although in some more than in others. Mr. Hallock's conclusion was that the chemical action did not take place between the copper and the sulphur *as a solid*, but that the active agent was the vapor of sulphur. In the same manner re-action took place between copper and mercuric chloride, the vapor of the latter passing through absorbent cotton.

Mr. Hallock does not deny that chemical action may take place between solids, — indeed, he is inclined to think that it does, — but he holds that Mr. Spring's experiments do not prove it.

The Solar Parallax.

Prof. William Harkness, a member of the United States commission to observe the transit of Venus, in a long paper read before the Philosophical Society at its last meeting, gave a very interesting description of the instruments used in observing the transit and in photographing the sun. Great labor, much of it very perplexing and occupying many weeks, was required to measure lenses used, and determine their focal distances, to ascertain the peculiarities of mirrors, etc., as preliminary to the observations. Professor Harkness described this work. About sixteen hundred photographs were secured, most of which have already been finished. The methods of reduction were also explained.

In the latter part of his paper, Professor Harkness spoke of the solar parallax and its related constants, introducing a series of intricate calculations which he has made to determine the latter. Among them may be mentioned the sun's distance from the earth as found by his calculations, 92,385,000 miles; as computed from data furnished by the transit of Venus, 92,521,000 miles; the moon's distance from the earth, 238,852.4 miles; the moon's mass, $\frac{1}{81.519}$; the velocity of light, 186,298.4 miles per second; sun's parallax, $8867'' \pm .0012''$.

An Eighth Sternum Rib.

At one of the meetings of the Anatomical Society during the late Medical Congress in Washington, Dr. Lamb of the Army Medical Museum spoke briefly of a singular phenomenon he had observed in his examination of human breast-bones. It was the occurrence, in a number of specimens, of an eighth rib, the cartilage that is usually found below the seventh rib being fully developed into a rib. Dr. Lamb first saw a specimen of this kind about ten years ago. While teaching, he had occasion to observe the subject he had before the class with great care, and was surprised on one occasion, on counting the ribs, to find that there were eight. He made no further investigation at the time, presuming that the phenomenon might be of comparatively frequent occurrence.

More recently Dr. Lamb has given the subject more attention, and now has in his own collection four specimens, while in the Army Medical Museum there are eight more. In all these cases the phenomenon occurs in negroes, but one additional specimen is that of an Indian.

Dr. Lamb has made a thorough search of anatomical literature

for references to the peculiarity mentioned. In the English books there is only a single incidental reference to it, and in that case the author does not say that he has ever seen a specimen. In German books there are two references, one of them being the one already mentioned by the English authority. The French anatomists do not mention it at all; and only one American, Allen, makes any reference to it. Among the anatomists attending the Medical Congress only two or three had seen specimens.

Dr. Billings, in a circular he has sent out to anatomists and others, has requested that information on the subject be sent to the Army Medical Museum.

The ethnological importance of Dr. Lamb's discovery has not yet been determined. If the eighth rib is found to occur more frequently in one race than in others, as the Washington specimens seem to point to the negro, the students of comparative anatomy may yet draw interesting deductions from that fact.

Measurements of Crania.

Under the direction of Dr. Matthews and Mr. Tracey, of the Army Medical Museum, a series of measurements of skulls is being made. About one hundred skulls, representing different nationalities, were selected from the three thousand which constitute the museum's collection, and a series of sixty linear measurements are made upon these in addition to measurements of certain angles and the ascertainment of the capacity of each skull. These measurements are mostly made upon lines of former ones, in order to preserve a uniformity of data, although many of them are considered of little or no value. A few new measurements are made, which, it is believed, will prove important. The measurements, together with descriptions of the skulls, will be published as a part of the catalogue of the Army Medical Museum which is contemplated.

It is not expected that any important conclusions will be reached as a result of the work above described. No fact has been better established than that the size of the brain or the shape of the skull has nothing to do with the mental capacity of the person. The causes of difference of intelligence must be sought elsewhere. It is possible that the measurements, if carried far enough, may tend to the establishment of distinct types of crania, and aid in their classification.

The Army Medical Museum collection of crania is in many respects a very interesting one. The number of Eskimo skulls is the largest yet made, and the department is especially rich in other aboriginal American crania. A recent accession of Peruvian skulls contains some curious specimens, especially of deformities. These were generally caused by bandaging and the binding of boards to the head, and a great variety of shapes was produced. Nothing is known as to the significance of these deformities. Whether they were distinguishing marks of different ranks in society or of the special rank of the individual, or were simply a custom, is a mystery.

Adulteration of Condiments.

The microscopist of the Department of Agriculture, Prof. Thomas Taylor, has begun an examination of the condiments of commerce for the purpose of ascertaining which of them are adulterated, the methods and extent of the adulteration, and of discovering methods by which the consumer may detect impure articles.

The first article treated was pepper, and the method of the investigation is here briefly described. A section of a pepper-corn is placed under a microscope, and magnified one hundred and fifty diameters. Its appearance is carefully noted and photographed, and a drawing in colors is made, showing exactly how it looks. The pure powder of pepper-corns is then treated in the same way, and, from a comparison of the image of this with that of the section, the changes caused by grinding may be noted. The next step was to examine specimens of the pepper of commerce to ascertain if it presented the same appearance as the pure pepper already photographed and drawn. In a majority of cases it did not, the differences being so striking as to mark it as an entirely different article.

Professor Taylor has ascertained that the substance used in adulterating pepper is the seed or stone of the olive. These are obtained in large quantities from the olive-oil factories, and ground up with the pepper-corns, the extent of the adulteration being in some cases as great as fifty per cent.

No method of popularly detecting adulteration of pepper has yet been found. In bulk the pure pepper is darker in color than that to which olive-seeds have been added; but the difference is so slight that no person, unless possessed of a sample to compare with, would be able to discover any difference.

A New Fibre from the Stalk of the Cotton-Plant.

A manufacturing firm in New York has sent to the Department of Agriculture specimens of a new fibre they are making from the stalk of the cotton-plant. The samples received strongly resemble hemp, and seem to be adapted to all the uses that hemp is put to. A few fibres of it twisted together in the hand show remarkable tensile strength, although no exact comparative tests with other fibres have yet been made. A collection of the fibres of hemp, flax, jute, ramie, etc., from all parts of the world is being made by the department, and a new instrument has been invented by which it is expected that the tensile strength of each will be ascertained with great accuracy.

If the cotton-plant turns out to furnish as valuable a fibre as now seems possible, an important new source of profit will be afforded the cotton-planters of the Southern States upon their crops.

HEALTH MATTERS.

Corrosive Sublimate as a Disinfectant.

AN exceedingly valuable contribution to the subject of disinfection has been made by Dr. W. B. Hills of Cambridge, Mass., in a paper presented by him to the Massachusetts Medical Society. His paper is entitled 'The Value of Corrosive Sublimate as a Practical Disinfectant.'

He criticises the work and report of the committee on disinfectants of the American Public Health Association, which, since its publication in 1885, has been the guide of most of the boards of health in the United States. He says of it, "An examination of the report of this committee fails, however, to bring to light the slightest particle of evidence upon which such a recommendation could have been based. The statements made relative to corrosive sublimate are very contradictory and confusing; the biological tests recorded are few in number and very unsatisfactory; and the report, as a whole, shows evidence of hasty preparation, and is not at all creditable to the committee."

He reviews that portion of the committee's report which treats of corrosive sublimate and its action, and puts the committee on its defence. He does not deal in generalities which cannot be met, but particularizes in such a manner, that, if wrong, his mistakes can and should be pointed out; while if, on the other hand, he is correct, his conclusion should be accepted, and those of the committee should be changed to be in accord therewith. The general result of his observations and experiments is summed up in the following paragraphs: —

"Corrosive sublimate, in a word, though a very efficient disinfectant as meaured by its power to destroy germs, is limited in its applications. It can be used for the disinfection of furniture and other articles made of wood or porcelain, or even metal, if varnished, the floors and walls of rooms, such parts of ships as can be reached with solutions, the hands and the surface of the body, and clothing and bed-linen if not soiled with discharges; in other words, for the disinfection of surfaces which are not themselves injured by contact with it, or surfaces which do not contain material of such a character as to destroy its efficiency. Its use for these purposes is, however, very much restricted, because we have no means of disposing of it, except through lead pipes.

"Objections have been made to it because of its poisonous character. The danger of poisoning, however, is very slight. The solutions employed are very dilute, and its taste is sufficiently disagreeable to attract attention before an amount sufficient to do any injury has been taken. If the solutions are colored, the danger of mistakes is much lessened. The same objection may be made with equal reason against all substances which we now recognize as disinfectants. Care is necessary in the employment of all of them,